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INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

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Applicant's or agent's file reference FR6044 DE	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/08472	International filing date (day/month/year) 31.07.2003	Priority date (day/month/year) 09.08.2002
International Patent Classification (IPC) or both national classification and IPC C08F10/00		
Applicant BASELL POLYOLEFINE GMBH et al		


- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets; including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 1 sheets.

- This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 07.02.2004	Date of completion of this report 06.12.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Thomas, D Telephone No. +49 89 2399-7837



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP 03/08472

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-27 as originally filed

Claims, Numbers

4 (part), 5-16 as originally filed
1-3, 4 (part) filed with telefax on 25.10.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

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IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☒ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☐ all parts.
- ☒ the parts relating to claims Nos. 1,2,4,5,6(part), 7-16 .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1,2,4,5,6(part), 7-16
	No: Claims	
Inventive step (IS)	Yes: Claims	1,2,4,5,6(part),7-16
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1,2,4,5,6(part),7-16
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1: Ep-A-0 522 424

1. The present application does meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1,2,4,5,6(part),7-16 is new in the sense of Article 33(2) PCT.
- 1.1 The document D1 discloses (the references in parentheses applying to this document):
a solid catalyst component (page 3, line 8 - line 18) containing:
 - (I) at least one member selected from the group consisting of metal magnesium and a hydroxylated organic compound, and oxygen-containing organic compounds of magnesium,
 - (II) at least one zirconium compound selected from the group consisting of oxygen-containing organic compounds and halogen-containing compounds of zirconium, and
 - (III) at least one silicon compound selected from the group consisting of polysiloxanes and silanes, with
 - (IV) at least one organoaluminum halide compound to obtain a solid product, isolating the solid product, and reacting this solid product with
 - (V) at least one halogen-containing compound of titanium

D1 fails to disclose to use a compound of the formula $M-R_x$ where M is a element of main group IV and R is halogen.

2. The present application does meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1,2,4,5,6(part),7-16 does involve an inventive step in the sense of Article 33(3) PCT.
- 2.1 The document D1 is regarded as being the closest prior art.
The subject-matter of claim 1 differs from D1 in that another electron donor (MCl_4 , where M is an element of main group IV of the periodic table) and an additional transition metal (D1 contains at least one zirconium compound) is used.
- 2.2 The problem to be solved by the present invention may be regarded as finding a

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Ziegler Natta catalyst that has a steep flank on the low molecular weight side.
None of the cited prior art documents disclose or suggest to use the electron donor specified in claim 1 in order to solve the above stated problem.
The solution proposed in claim 1 of the present application is therefore considered as involving an inventive step (Article 33(3) PCT).

Claims

1. A Ziegler catalyst for preparing 1-olefin homopolymers and copolymers by polymerization of a 1-olefin of the formula $R^4CH=CH_2$, where R^4 is hydrogen or an alkyl radical having from 1 to 10 carbon atoms, in suspension, in solution or in the gas phase, which catalyst comprises the reaction product of a magnesium alkoxide (component a) with a ~~titanium~~ compound (component b) and an organometallic compound (component c) together with an additional component (d) comprising a compound of the chemical formula



where M is an element of main group IV of the Periodic Table, R is halogen ~~or an organic radical such as alkyl having from 1 to 10 carbon atoms, oxyalkyl having from 1 to 10 carbon atoms, cycloalkyl having from 4 to 8 carbon atoms in the ring and, if desired, from 1 to 6 substituents R' on the ring, aryl having from 6 to 10 carbon atoms in the aromatic and, if desired, from 1 to 6 substituents R' on the aromatic, where R' is a halogen or an alkyl radical having from 1 to 4 carbon atoms or an OH group or an NO₂ group or an oxyalkyl radical having from 1 to 4 carbon atoms, and x is an integer from 1 to 4.~~

2. A Ziegler catalyst as claimed in claim 1, wherein the radicals R in component (d) are identical and the element of main group IV of the Periodic Table present in component (d) is preferably silicon or germanium.
3. A Ziegler catalyst as claimed in claim 1, wherein the radicals R in component (d) are not identical and radicals R having various possible meanings are combined with one another and the element of main group IV of the Periodic Table present in component (d) is preferably silicon or germanium.
4. A Ziegler catalyst as claimed in one or more of claims 1 to 3, wherein component (a) is a magnesium alkoxide of the formula $Mg(OR^1)(OR^2)$, where